1. About This Guidance

1.1 The National Planning Policy Framework (NPPF) indicates that Local Development Documents form the framework for making decisions on applications for planning permission. Decisions have to be taken in accordance with the development plan unless other material considerations indicate otherwise. NPPF advises that a local planning authority may prepare Supplementary Planning Documents to provide greater detail on the policies in its Local Plan. Supplementary Planning Documents are a ‘material’ consideration when planning applications are decided.

1.2 As required by the Planning and Compulsory Purchase Act 2004 we have prepared a Statement of Community Involvement (SCI) which sets out how we will involve the community in preparing our Local Plan and consulting on planning applications. In accordance with the SCI we have involved people who may be interested in this Supplementary Planning Document and asked them for their comments. We have produced a consultation statement which summarises all the comments people made to us and our response. This is available on request.

2. Introduction

2.1 This Supplementary Planning Document offers guidance to anyone seeking to develop land which may have, or is in proximity to a site that has, value for biodiversity and/or geological conservation. Paragraph 4.3 in the guidance section gives advice on how this is established.

2.2 Biodiversity is the variety of life on earth, from complex ecosystems, through individual species of plants, animals, fungi etc to the genetic differences within a species. Biodiversity is important for its own sake, and human survival depends upon it. The ground-breaking UK National Ecosystem Assessment (NEA) published in June 2011 provides a comprehensive account of how the natural world, including its biodiversity, provides us with services that are critical to our wellbeing and economic prosperity. The State of Nature figures 2016 states that between 1970 and 2013, 56% of species declined, with 40% showing strong or moderate declines.

2.3 Geodiversity is the term used to describe the variety of ancient rock, fossils, minerals, earth structures, sediments, soils and more recent landforms (depositional and erosional features) that create the foundations of physical landscapes and habitats. The recognition, management, and conservation of significant sites is important as it contributes to understanding and maintaining the natural environment, to scientific research and to teaching an understanding of the earth, as well as to leisure activities and the enhancement of green spaces. The industrial heritage of the area and building construction are closely linked to the geological resources of the area, particularly coal, clay, ironstone, sandstone and roofing flags. It is essential that geoconservation factors are taken into account in the planning process, the opportunities for educational, scientific and recreational advance are appreciated and realised and that significant features of geological interest are conserved.

2.4 The richness of the biodiversity of Barnsley owes its existence to the borough’s varied geology giving rise to a range of landscapes – from the open moors in the west, to the
Supplementary Planning Document: Biodiversity and Geodiversity

lowlands of the Dearne in the east – each landscape, be it moorland, woodland, grassland, wetlands, parks and gardens or neglected former industrial land, supports its own habitats and species which contribute to local distinctiveness and character. Some of these habitats are recognised as being of national and even international importance, while other areas are recognised as important at a local level. They support a countless number of wild species, many of which are noted as being rare or threatened in the UK.

2.5 Barnsley borough has, at the time of writing, 2 Internationally-designated statutory nature conservation sites (‘Natura 2000’ sites) which are to the west, in the Peak District National Park Local Planning Authority (LPA) area. The Barnsley LPA area contains the following nationally-important statutory sites: all or part of 7 Sites of Special Scientific Interest (SSSIs), 5 Local Nature Reserves (LNRs) and one Nature Improvement Area (NIA). The SSSIs list includes sites designated for their biodiversity or (separately) geodiversity value. Non-statutory Local Wildlife Sites (LWSs) and Local Geology Sites/ Regionally Important Geological and Geomorphological Sites (LGSs/ RIGS) have been designated in the borough for their local ecological or geological value respectively. Up to date lists of statutory and non-statutory sites can be found at: https://magic.defra.gov.uk/MagicMap.aspx; http://www.barnsleybiodiversity.org.uk/ and http://www.sagt.org.uk/

2.6 The rocks underlying Barnsley borough are Upper Carboniferous in age, and are mainly mudstones, siltstones and sandstones with coal seams, some of which are/were of major importance. There are also beds of ironstone and roofing flags. In the west of the borough, by Dunford Bridge, are the "Millstone Grit" sandstone outcrops of the Pennines. These rocks support expanses of peat and acid heathland. The more resistant sandstones form hills and edges, which run roughly northeast – southwest and influence the shape of river catchments as well as the flow of groundwaters and geochemistry of the river ecosystems.

2.7 Many of Barnsley’s older settlements are located on the slightly higher ground of the "Coal Measures" sandstones, above the less-well drained areas underlain by mudstone. Extractive industries still provide some employment in quarrying stone and pot clay, and many of the older buildings in Barnsley include local sandstones. Some of these sites have become a significant source of raw materials, including stone for appropriate building conservation within the region, enabling a distinctive sense of place and authenticity to be maintained.

3. Policy

3.1 The NPPF lists in its sections 170, 171, and Nos. 174-177 issues of particular relevance to biodiversity and geological conservation. These are detailed in Appendix D.

3.2 This document supplements the following Local Plan policies:

Policy BIO1 Biodiversity and Geodiversity

Development will be expected to conserve and enhance the biodiversity and geological features of the borough by:
• Protecting and improving habitats, species, sites of ecological value and sites of geological value with particular regard to designated wildlife and geological sites of international, national and local significance, ancient woodland and species and habitats of principal importance identified via Section 41 of the Natural Environment & Rural Communities Act 2006 (for list of the species and habitats of principal importance) and in the Barnsley Biodiversity Action Plan;

• Maximising biodiversity and geodiversity opportunities in and around new developments;

• Conserving and enhancing the form, local character and distinctiveness of the boroughs natural assets such as the river corridors of the Don, the Dearne and Dove as natural floodplains and important strategic wildlife corridors;

• Proposals will be expected to have followed the national mitigation hierarchy (avoid, mitigate, compensate) which is used to evaluate the impacts of a development on biodiversity interest;

• Protecting ancient and veteran trees where identified;

• Encouraging provision of biodiversity enhancements.

Development which may harm a biodiversity or geological feature or habitat, including ancient woodland and aged or veteran trees found outside ancient woodland, will not be permitted unless effective mitigation and/or compensatory measures can be ensured;

Development which adversely affects a European Site will not be permitted unless there is no alternative option and imperative reasons of overriding public interest (IROPI).

Policy GI1 Green Infrastructure

We will protect, maintain, enhance and create an integrated network of connected and multi-functional Green Infrastructure assets that:

• Provides attractive environments where people want to live, work, learn, play, visit and invest;

• Meets the environmental, social and economic needs of communities across the borough and the wider City Regions;

• Enhances the quality of life for present and future residents and visitors;

• Helps to meet the challenge of climate change;

• Enhances biodiversity and landscape character;

• Improves opportunities for recreation and tourism;

• Respects local distinctiveness and historical and cultural;
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- Maximises potential economic and social benefits;
- Secures and improves linkages between green and blue spaces.

At a strategic level Barnsley's Green Infrastructure network includes the following corridors which are shown on the Green Infrastructure Diagram (see below):

- River Dearne Valley Corridor;
- River Dove Valley Corridor;
- River Don Valley Corridor;
- Dearne Valley Green Heart Corridor;
- Historic Landscape Corridor.

The network of Green Infrastructure will be secured by protecting open space, creating new open spaces as part of new development, and by using developer contributions to create and improve Green Infrastructure.

We have produced a Green Infrastructure Strategy for Barnsley which is informed by the Leeds City Region and South Yorkshire Green Infrastructure Strategies.
Policy GS1 Green Space

We will work with partners to improve existing green space to meet the standards in our Green Space Strategy.

Green Spaces are green open areas which are valuable for amenity, recreation, wildlife or biodiversity and include types such as village greens, local open spaces, country parks, formal gardens, cemeteries, allotments, woodlands, recreation grounds, sports pitches and parks.

Proposals that result in the loss of green space, or land that was last used as green space, will not normally be allowed unless:

- An assessment shows that there is too much of that particular type of green space in the area which it serves and its loss would not affect the existing and potential green space needs of the borough; or

- The proposal is for small scale facilities needed to support or improve the proper function of the green space; or

- An appropriate replacement green space of equivalent or improved quality, quantity and accessibility is provided which would outweigh the loss.

In order to improve the quantity, quality and value of green space provision we will require qualifying new residential developments to provide or contribute towards green space in line with the standards set out in the Green Space Strategy and in accordance with the requirements of the Infrastructure and Planning Obligations Policy. The Supplementary Planning Document ‘Open Space Provision on New Housing Developments’ offers guidance to developers on what will be expected in terms of open space provision in order to achieve those standards.

Where there is a requirement to provide new green space an assessment will be carried out to determine the most appropriate provision, taking into account site characteristics and constraints. In cases where it is deemed unsuitable to make provision for open space within or adjacent to a development site, suitable off-site open space facilities may be acceptable either as new facilities or improvements to those existing. Where appropriate new green space should secure access to adjacent areas of countryside.

Nature Improvement Area

3.3 The Local Plan also refers to the Dearne Valley Green Heart ‘Nature Improvement Area’ (NIA), which includes parts of Barnsley, Doncaster and Rotherham boroughs. NIAs are large, discrete areas that will deliver a step change in nature conservation, where a local partnership has a shared vision for their natural environment. NIAs were established to help address ecological restoration as part of series of actions at a landscape-scale to improve biodiversity, ecosystems and our connections with the natural environment identified by the Natural Environment White Paper (2011) and taking forward recommendations identified in the Lawton Review *Making Space for Nature* (2010). The Dearne Valley Green Heart has been designated as an NIA and its extent within Barnsley’s boundary can be seen in the map in figure 17.1 from the Local Plan (reproduced above, with a more detailed map in Appendix A).
3.4 The Dearne Valley supports nationally important assemblages of breeding birds of lowland damp grassland, lowland open water and their margins and scrub plus nationally important numbers of some individual species of breeding water birds. The Dearne Valley has the ambition to become a new type of urban area for living, working and relaxing, in which environmental quality, biodiversity and contact with nature underpin the choices people make to move to and invest in the area and create a sustainable future there. The River Dearne provides a fantastic asset to the valley and the surrounding communities, with its wetlands, washlands and marshlands providing a haven for wildlife. The valley has many publicly-accessible woodlands with networks of footpaths, cycle and bridle trails. Over recent years reclaimed colliery sites have been restored to create community green spaces and the valley is a model for large-scale environmental regeneration. Economic regeneration and prosperity are key to addressing social deprivation arising from the area’s industrial past.

3.5 The vision of the NIA partnership is to restore and enhance the ecological network in the valley. At its core will be areas of reedbeds, fen, wet grassland, wet woodland and woodland buffered by areas of farmland, amenity grasslands, parklands and reclaimed industrial areas whose biodiversity value will be enhanced. ‘Stepping stone’ sites exist along the river corridor where habitat should be enhanced and specific measures put in place for species such as eels, otters and water voles. The NIA area will support an even richer diversity of wildlife, including nationally-important numbers of wintering waterbirds and breeding farmland birds.

**Barnsley Biodiversity Action Plan**

3.6 The Barnsley Biodiversity Action Plan (BAP) is produced by Barnsley Biodiversity Trust and is reviewed periodically. The BAP lists the key species and habitats targeted for specific conservation action in the borough. The list draws from nationally-approved BAP targets but also includes certain species and habitats which the Trusts’ partners feel to be locally important too. The BAP indicates conservation actions which should be taken to help protect the species and habitats and/or allow them to recover. Barnsley Council has adopted the BAP as part of the evidence-base supporting Local Plan decisions. The presence of local priority habitats and species identified in the BAP is a material consideration in planning decisions.


4. **Guidance**

4.1 Any development proposal which may do harm to a biodiversity or geodiversity interest should follow the mitigation hierarchy thus: *avoid, mitigate, compensate*. If it is not possible to avoid damage to the interest and planning permission is still requested for then the developer/applicant should seek to mitigate impacts by good design which not only retains as much of the value *in situ* as possible, but also reduces impacts during the construction
phase and leaves behind value which is protected and maintained. On occasion, the LPA may allow compensatory works on other sites outside of the development where avoidance or mitigation are not possible/sufficient, but this should be seen as a last resort. The LPA will not support applications that would damage the ecological network and cause a net-loss in biodiversity in line with the NPPF. Whilst the Environment Agency is the lead authority regarding implementation of the Water Framework Directive and the Humber River Basin District Management Plan, the LPA must have regards to them when determining development proposals.

4.2 At present there is no nationally-agreed system for measuring biodiversity or geodiversity losses proposed on a site through a development and creating a comparable biodiversity element off-site (biodiversity compensation). It is likely that one will be made available in the near future. The LPA may choose to adopt such a ‘metric’ and apply it in cases where compensation works are the only possible solution – in which case a new policy will be produced and publicised. Until such time the LPA will continue to use its best judgement, based on precedents, as to what the appropriate compensation amount, as a monetary value, should be.

4.3 Biodiversity and/or geodiversity mitigation plans should be designed-in from the outset, with suitably qualified and experienced professionals being part of the design team to prevent conflicts of interest. Any landscape design plans/documents should clearly identify between ornamental plantings and ‘green’ features which are part of biodiversity retention/mitigation/enhancement. A maintenance plan for a minimum of 5 years should be provided – for example, if a valuable hedgerow or quarry is to be incorporated within a development, the application should state how it will be protected and managed. Planning applications will be expected to commit to not cover trees, hedgerows or other habitats with netting etc, prior to construction in order to exclude birds from nesting, etc. Mitigation and enhancement proposals are welcomed that contribute to enlarging, enhancing and connecting existing wildlife sites, creating new sites, and providing joined up and resilient ecological networks throughout the borough. This includes conserving and enhancing the form, local character and distinctiveness of the borough’s natural assets such as the river corridors of the Don, the Dearne and Dove as natural floodplains and important strategic wildlife corridors.

4.4 Ecology or geodiversity reports submitted in support of planning applications should not only evaluate the site’s importance, but also detail the mitigation, etc proposals. Relevant externally-held data sources should be contacted to provide their data as appropriate given the likely value of the features in the locality and proportionate to the development proposal. Report recommendations such as ‘the applicant could install…..’ are insufficient: report authors should work with applicants to offer clear measures which could be conditioned at planning decision stage. 2 key reference documents, the British Standard, BS 42020: 2013: Biodiversity: Code of Practice Planning and Development, and the CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition, should be used by the applicant’s ecologists when writing ecology reports to guide their evaluation and recommendations. Local Validation Requirements for planning applications have been adopted by the LPA which include biodiversity and geodiversity elements that state when relevant reports are required and outline what, broadly, is needed within them.
4.5 Local Plan allocations have been assessed for their biodiversity value. Some site specific policies contain biodiversity requirements. Where the ecological assessments carried out to inform the Local Plan site selection process assessed a site as having medium or high biodiversity value, and that value has been eroded through the actions of a landowner, the site will still be expected to deliver net gains in biodiversity assessed against the Local Plan ecological assessment.

4.6 Barnsley’s history of quarrying, mining and the building of regional transport infrastructure created a variety of old and valuable geological surface exposures but many of these are now becoming lost to infilling, neglect and development in both urban and rural situations. This dwindling of exposures takes on added significance since the ending of coal mining has prevented underground study of faults and strata in three dimensions, thereby leaving surface exposures as the only source of primary evidence.

4.7 Some compensation for loss of the sub-surface data can be achieved by applying new technologies and techniques to surviving surface exposures, resulting in a wealth of valuable information on the geodiversity/geomorphological feature and its local and regional structure. For these reasons, geoconservation is important. Some developments can create new geoconservation/geomorphological sites and opportunities, either temporary, or possibly permanent. Where an application proposes that geoconservation/geomorphological assets will be lost or diminished, the applicant and their geoconservationists should consult the LPA and its geological advisors, Sheffield Area Geology Trust (SAGT) in drawing up proposals to mitigate the effects.

4.8 Prior to submission of any planning application, all relevant geodiversity datasets should be gained, particularly those held by SAGT. Geological sites should be recorded by suitably qualified and experienced geoconservationists/geomorphologists using the best means available, including photography and sampling, before the loss of/damage to the feature occurs. Information obtained in this way, by the cooperation of the developer, will be shared freely with the local museum service and other publicly-owned stakeholders, for the benefit of the wider community with geological geomorphological interests.

4.9 The geoconservation and biodiversity needs at any one site are considered on a case by case basis but geoconservation aims to achieve the following goals:

- to preserve the geological/geomorphological integrity of the site;
- to preserve its visibility and availability for scientific and educational use;
- to ensure workable, ongoing access arrangements after completion, and;
- to work to protect the value from any subsequent risks from the new landowners, tenants, or residents.

**Nature Improvement Area**

4.10 Within the NIA (Nature Improvement Area) we require specific biodiversity enhancements with developments over and above the minimum mitigation/compensation measures. Great nature-spaces provide the ideal background for investment in housing and industry.
4.11 The NIA Partnership has 2 main aims for development in the area:

1. The network of sites and places for nature across the NIA is restored and enhanced. This makes our important natural assets more useful for wildlife and more resilient in the future. In reality this means that the partnership will actively seek opportunities to infill and augment the nature network with new and restored wildlife sites.

2. Where development of housing and Industry is appropriate, the LPA will support developers in the creation of sustainable sites that include good examples of sustainable drainage, incorporated high quality habitats and wildlife corridors and encourage the use of sustainable transport.

4.12 This SPD does not describe detailed design guidance on how to realise the aims of the NIA Partnership. Instead, it identifies the key issues that should be reconciled, through good practice points, whilst also drawing attention to relevant policies, documents and contact names. A combination of all these components will, through appropriate negotiations, achieve a development proposal that will accord with the aims of the NIA.

4.13 The quality of design of new development is a critical factor in ensuring the overall success of the NIA. The design of development should reflect the specific objective(s) for each site (e.g. biodiversity, public access, wood products etc). It is important that good design is used to provide and promote accessibility to the NIA for everybody in the borough. In turn, this will help to promote the economic vitality and viability of the area.

4.14 Minor developments will not be required to contribute to ecological improvements in the NIA. Small housing developments, up to ten units, and conversions of traditional buildings have not been covered in the specific guidance relating to the NIA but would be subject to the existing validation process and planning policy requirements of the relevant planning authority. Therefore, only development proposals of a scale that can contribute a significant, quantifiable benefit, or conversely undermine the ability, i.e. a loss of wetland areas, of the NIA to meet its aims and objectives should be subject to this SPD.

4.15 Such quantifiable, significant benefits could include:

- New woodland;
- New wetland;
- Enhancing areas of poor environmental quality;
- Improving public access, or
- Improving the management of existing habitats;

4.16 Development proposals considered by the LPA to be of a scale that would significantly impact on the delivery of the aims and objectives of the NIA, shall seek to enhance and improve the ecological network of the valley by incorporation of features and design
principles that follow the conservation principles supported in the Natural Environment White Paper.

4.17 Within the NIA we would expect to see developments come forward where the natural environment has been taken into consideration early in the design process and connection through and around the development site with the wider habitat networks is delivered. Small commercial and retail development sites (less than 1,000 m3) and sites with limited ecological interest are expected to provide modest enhancements. Major developments\(^1\), including business parks, particularly those in close proximity to river corridors or NIA key sites, will be supported to incorporate positive full-site biodiversity measures including comprehensive sustainable drainage systems and landscape schemes. Such sites will be expected to provide connectivity throughout the site and link to sites and features outside the site. It is recommended that such schemes are included in master-planning and are agreed at an outline stage to prevent inconsistent and piece-meal delivery.

4.18 Where a development agreement involves a commuted sum arrangement in relation to the delivery of biodiversity (or drainage) elements the NIA partnership should be involved in discussions to agree those elements. Where possible, such arrangements should aim to support the delivery of NIA aims.

4.19 We would welcome applications that seek to provide improvement for the priority species listed in Appendix B.

4.20 Opportunities for biodiversity enhancements in developments by size of development are suggested in Appendix C.

4.21 Case studies relating to innovative biodiversity enhancements on new developments can be viewed in Appendix C.

5. Further information

  - 56 Circular 06/2005 provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.
  - 57 Where areas that are part of the Nature Recovery Network are identified in plans, it may be appropriate to specify the types of development that may be suitable within them.
  - 58 For example, infrastructure projects (including nationally significant infrastructure projects, orders under the Transport and Works Act and hybrid bills), where the public benefit would clearly outweigh the loss or deterioration of habitat.

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\(^1\) As defined in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2015 and subsequent updates
- Barnsley Biodiversity Trust: http://www.barnsleybiodiversity.org.uk/
- The current Barnsley Biodiversity Action Plan is viewable either directly from the Trust’s homepage or here: http://www.barnsleybiodiversity.org.uk/Barnsley%20BAP%202009.pdf
- British Standard BS 42020: 2013: Biodiversity: Code of Practice Planning and Development: https://shop.bsigroup.com/ProductDetail/?pid=000000000030258704
Appendix A. Detailed map of Dearne Valley Green Heart ‘Nature Improvement Area’
Appendix B. Priority Species for Dearne Valley Green Heart ‘Nature Improvement Area’

We would welcome applications that seek to provide improvement for the focal species of the NIA as set out below:

- Lapwing
- Redshank
- Snipe
- Wintering teal
- Wintering wigeon
- Wintering bittern
- Barn owl
- Willow tit
- Water vole
- Brown hare
- Noctule bat
- Grass snake
- Dingy skipper
- Wild flowers
Appendix C. Opportunities for biodiversity enhancement in new development

Applicants are expected to provide biodiversity features from the below lists proportionate to the size of the development, the proposed impacts of the site and in relation to nearby habitats.

<table>
<thead>
<tr>
<th>Smaller scale commercial and industrial buildings e.g. retail, factories, offices and warehouses (less than 1000m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Native species hedgerow planting</strong></td>
</tr>
<tr>
<td><strong>Insect boxes/ Bee hotel</strong></td>
</tr>
<tr>
<td><strong>Bird boxes</strong></td>
</tr>
<tr>
<td><strong>Tree planting</strong></td>
</tr>
<tr>
<td><strong>Living Roofs</strong></td>
</tr>
<tr>
<td><strong>Swift bricks/ internal nest boxes</strong></td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th><strong>SuDS</strong></th>
<th>Habitat for wetland plants and invertebrates. Valuable for amphibians especially where standing water provided. Add to the setting of a development as part of the green space requirement.</th>
<th><a href="https://www.rspb.org.uk/globalassets/downloads/documents/positions/planning/sustainable-drainage-systems.pdf">https://www.rspb.org.uk/globalassets/downloads/documents/positions/planning/sustainable-drainage-systems.pdf</a></th>
<th>Developers should be careful to check with bodies adopting/maintaining any new SuDS scheme for any restrictions in relation to planting and maintenance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of native tree and shrub species in landscaping</td>
<td>Provide shelter and screening. Provide nesting sites and food for birds and insects.</td>
<td><a href="http://www.tdag.org.uk/trees-in-the-townscape.html">http://www.tdag.org.uk/trees-in-the-townscape.html</a></td>
<td>Species to consider depend on site conditions and location and include oak (pedunculate and sessile), rowan, willow sp, wych elm, ash, birch (downy and silver), bird cherry, hazel, elder, alder, aspen, guelder rose, crab apple, hawthorn, blackthorn, broom, gorse, dog rose, juniper, holly.</td>
</tr>
<tr>
<td>Green walls/habitat walls, Willow fedge (fence/hedge).</td>
<td>Can provide excellent visual features. Shelter, food and nesting sites for birds and insects. Willow in particular is inexpensive and easy to establish from cuttings.</td>
<td><a href="http://www.livingroofs.org">www.livingroofs.org</a> <a href="http://www.grassroofcompany.co.uk">www.grassroofcompany.co.uk</a></td>
<td>Hedges require annual maintenance.</td>
</tr>
<tr>
<td>Introduce wildflowers into verges.</td>
<td>Food plants for butterflies and other insects.</td>
<td><a href="https://plantlife.love-wildflowers.org.uk/roadvergecampaign">https://plantlife.love-wildflowers.org.uk/roadvergecampaign</a></td>
<td>Many grasses are tolerant of fairly high levels of salt but the following are particularly salt tolerant and may be suitable for roadside verges; red fescue, creeping bent, Yorkshire fog, creeping soft grass.</td>
</tr>
</tbody>
</table>

**Major development including residential, commercial, minerals or waste**

<p>| <strong>As above plus SuDS</strong> | Creation of ponds or wetland habitats will support a variety of wetland plants and attract birds and insects. Even small areas of permanent water or wetland vegetation in detention basins can be beneficial. | See links for SuDS and ponds and soak-a-ways above. | Consider reed beds or willow filtration systems as alternatives for water treatment. Living roofs may be most appropriate to deal with surface water where space is limited. |</p>
<table>
<thead>
<tr>
<th>Incorporate habitats/features within green space to create green corridors.</th>
<th>Retain existing wildlife habitat within the development. Links with other natural areas and the surrounding countryside are important to allow movement of wildlife along corridors. This contributes to a developments green space requirements.</th>
<th><a href="http://www.woodlandtrust.org.uk">www.woodlandtrust.org.uk</a></th>
<th>Link existing wildlife habitat and/or newly created green spaces with strategically placed trees, shrubs, hedges, dry stone wall or grass verge.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat creation and restoration of existing habitats.</td>
<td>Contribute to meeting Local Biodiversity Action Plan targets for priority habitats. Creating/restoring high quality green space to enhance development. Consider wildflower grassland, native species woodland and wetland habitats. This contributes to a developments green space requirements.</td>
<td><a href="http://jncc.defra.gov.uk/page-5706">http://jncc.defra.gov.uk/page-5706</a> <a href="https://www.tcpa.org.uk/fact-sheet-green-infrastructure-and-biodiversity">https://www.tcpa.org.uk/fact-sheet-green-infrastructure-and-biodiversity</a></td>
<td>Consider opportunities to re-meander canalised streams and rivers.</td>
</tr>
<tr>
<td>Use show home garden or demonstration area on industrial site to demonstrate wildlife gardening.</td>
<td>Food and shelter for birds, insects and amphibians.</td>
<td><a href="http://downloads.gigl.org.uk/website/Wildlife%20Gardening%20Pack.pdf">http://downloads.gigl.org.uk/website/Wildlife%20Gardening%20Pack.pdf</a></td>
<td>Include use of bat boxes/bird boxes/bee hotels, log piles, planting to encourage butterflies, bumble bees and birds. Wet areas/pond for common frog, newts and damselflies.</td>
</tr>
<tr>
<td>Develop a site/Company Biodiversity Action Plan (BAP).</td>
<td>Contribute to Local and English Biodiversity Action Plan targets and create a work/development site providing a network of habitats.</td>
<td><a href="http://www.businessandbiodiversity.org/action_company_bap.html">http://www.businessandbiodiversity.org/action_company_bap.html</a></td>
<td>All/any of the options listed above could be incorporated into a Site/Company BAP.</td>
</tr>
</tbody>
</table>
Case Studies: Urban Green Infrastructure for Biodiversity

Introduction

The intention is to provide examples of a range of urban green infrastructure interventions, including green roofs, living walls, sustainable drainage schemes and species-rich grasslands. These examples are multi-functional and demonstrate how biodiversity can be enhanced whilst various ecosystem services are provided, including flood management and cooling. Costs are provided where available and are only indicative. It should be noted that for relatively small, novel schemes, establishment costs may be relatively high. Installation or establishment costs will fall as the industry adapts to new techniques. Maintenance costs of small schemes also tend to be relatively high when compared with larger schemes on a pro-rata basis.

Biodiverse Extensive Green Roofs

Biodiverse extensive green roofs are typified by free draining and water absorbent substrates of varying depth. They often include dead wood habitat, stones or pockets of bare sand. They are vegetated with predominantly native drought tolerant wildflowers. Sedum is usually included, however the industry norm of Stonecrop (Sedum sp.) dominated vegetated blankets should be avoided because they do not support a sufficiently diverse assemblage of flora and fauna and may not provide sufficient water attenuation. There should be a presumption for any proposals for biodiverse extensive green roofs to include a minimum of 80 mm substrate depth, a standard set in the UK by the Green Roof Code from The Green Roof Organisation (2011 to be updated 2014).
Biodiverse extensive green roofs are relatively lightweight and low maintenance. Specifications with proven ecological value for foraging birds and invertebrates were pioneered by the Green Roof Consultancy http://greenroofconsultancy.com. For further information on how to attract invertebrates to green roofs see also the report by Buglife – The Invertebrate Conservation Charity. http://www.buglife.org.uk/sites/default/files/Creating%20Green%20Roofs%20for%20Invertebrates_Best%20practice%20guidance.pdf

Typical Extensive Green Roof Section

Green Roof Example 1: Ruislip Central Line Depot Roof London Underground Limited

This is a retrofit demonstration project. The primary purpose is to absorb and slow down rainfall runoff and to reduce the risk of surface water flooding, however the brief also required an approach that enhanced biodiversity. It was important that saturated weight did not exceed 100kg/m², a requirement of this roof and many other London Underground train sheds with relatively lightweight structures.

Two adjacent biodiverse extensive green roofs types covering a total area of 122m² have been installed on a flat roof section at the depot. One section has a typical extensive green roof build up with protection sheet over the original waterproofing, drainage board, filter fleece with Optigreen extensive green roof substrate and the other section has been constructed using an experimental approach. Both plots are vegetated with sedum cuttings and seeded/planted with native annual and perennial wildflowers.
Monitoring devices have been installed in two downpipes of one of the biodiverse green roofs and two down pipes of a conventional control roof to measure the water attenuation.

Construction Costs: £80/m² (Total £10,000)

Running Costs: £200 (annual check of drainage outlets)

Design and Installation by Green Roof Consultancy Ltd

Monitoring by University of East London

Funding by Greater London Council through Drain London

**Image: Green Roof Consultancy**

**Green Roof Example 2:**
**Factory, Sins, Switzerland**
**Gemperle AG**

Swiss Federal law requires green roofs on all large commercial buildings. The conservation of biodiversity is usually the primary objective with roof greening in Switzerland. In this case the owners also wanted to keep the building cooler in summer to improve the comfort of workers. This is an example of an extensive green roof on a new-build factory/storage building.

There are two sections, one flat and the other barrel vaulted. The build up includes 100mm depth of commercially available recycled crushed-brick based substrate placed above a filter sheet and polystyrene drainage board. Areas of pebbles, stone and logs are also included to provide habitat diversity. There is also an area of shallow ephemeral pond. The roof is vegetated by wildflower seed and sedum cuttings of local provenance.
Maintenance of the roof is minimal, with an annual check of downpipes. Although this roof is not designed for ground nesting birds and may be too small for that purpose, many of the larger green roofs on industrial buildings in the Zurich area provide nesting habitat for Lapwing.

Area: Total of 1250m²: the flat roof section measuring approximately 450m² and the other barrel vaulted section, measuring approximately 800m².

Construction Cost: £50 per m² (70 CHF)

Running Costs: £100 (estimated) - annual check of drainage outlets

*Roof shortly after installation with annuals prominent (Image: Green Roof Consultancy)*
Overview after establishment (Image: Gemperle AG)

General view of factory (Image: Gemperle AG)
Green Roof Example 3:
Kemp House, Soho, London
City West Homes

Two biodiverse extensive green roofs covering an area of 330m² retrofitted on a social housing block with the primary aim of meeting the City of Westminster and London’s Biodiversity Action Plan targets, creating habitat for the rare Black Redstart and invertebrate species. Further targeted benefits were also to cool the rooms below and to reduce surface run off by storing rainwater. The build up comprises Optigreen substrate at a depth that meets the GRO Code (80mm) with plug-planted sedum mat, with some areas that have been mounded with additional material and seeded. There are over 30 species of native wildflowers. In addition spring bulbs and log piles provide a range of habitats for both rare invertebrates. Immediately after installation three Black Redstarts were observed on the roofs and this species is now breeding for the first time in Soho. Residents within this social housing complex are able to view both green roofs from their windows and from the roof top garden adjacent to one area of biodiverse green roof.

Construction Cost: (£75 per m² (Total £ 25,000)

Maintenance Costs: £200 per annum (check of drain outlets, weeding)

Design by Green Roof Consultancy, materials supplied by Optigreen, seed from Emorsgate, plug plants from Boningales and installation by Landmark Living Roofs

Image: Landmark Living Roofs/ Optigreen
Green Walls
Green Wall Example 1: Vertical Rain Garden
Tooley Street, London
Team London Bridge

This is a 25m² modular living wall combined with rainwater storage tanks. Downpipes from the pitched roof above are diverted into the tanks which are at the rear of the planters, between the planters and the supporting wall. Water slowly seeps through the modules, which makes the living wall self-watering thereby avoiding the need for pumped irrigation or use of potable water. The purpose is to reduce localised surface water flooding during intense summer storms where Tooley Street meets Tower Bridge Road. The planters are filled with intensive green roof substrate and native and non-native planting is combined to provide value for biodiversity and visual amenity.

Species include ivy *Hedera helix*, elephant’s ears *Bergenia cordifolia*, hart’s-tongue fern *Asplenium scolopendrium*, scaly male fern *Dryopteris affinis* and periwinkle *Vinca major*. Maintenance is four visits per annum for weeding and replacement of lost/damaged plants.

Construction Cost: £10,000

Maintenance Costs: £400/annum (two annual inspections for weeding/replanting)

Designed by Green Roof Consultancy and supplied and installed by Treebox Ltd.

Funding provided by the Greater London Authority through Drain London.
Green Wall Example 2: Wire Trellis  
Stucki Shopping Centre, Basel, Switzerland

A vegetated façade created by tensioning stainless steel wires between anchors in the ground and on the roof of a commercial building. Climbing and trailing plants have been trained onto the wires from the beds below and the roof above to provide screening and habitat. The beds below receive run-off from the adjacent path so that the intervention constitutes a SuDS feature and the plants and do not require irrigation (except during establishment).

Such planting can attract invertebrates and birds seeking shelter, food and nesting opportunities in otherwise unused space. A range of attractive wildlife friendly native species can be selected to provide interest that is evergreen or deciduous, flowering and fruiting and can be utilised even in shaded conditions. Species used include Honeysuckle *Lonicera* species, Clematis *Clematis armandii*, vines *Vitis cognetiae*, ivy *Hedera helix*, Boston ivy *Parthenocissus quinquefolia* and star jasmine *Trachelospermum jasminoides*. Ivy a native evergreen climber with glossy foliage and nectar rich flowers which will provide bee species with much needed food sources over autumn and winter. Annual maintenance is required to cut back unwanted shoots and replace any losses.

Shading and reduction of airborne pollutants are amongst the other benefits to this type of planting.

Area: 50 linear metres with height of 20m (1000m²)

Cost: £7500 (based on estimate of £150 per linear metre) Cost per unit area is highly variable depending on height.

Information provided by Dr. Nathalie Baumann, University of Zurich

Image: Gary Grant
Sustainable Drainage Features

The principles of the design concept of Sustainable Drainage Systems (SuDS) are to mimic natural drainage by intercepting rain via vegetation, storing runoff in the soil or waterbodies and releasing it slowly (attenuation) and by promoting evapo-transpiration. Where ground conditions permit water may also soak into the ground (infiltration). Water may also be slowly transported on the surface through swales. In this way the risk of flood is reduced, pollution is reduced, biodiversity increased and amenity improved. SuDS can involve a wide range of components including green roofs, permeable paving, specially designed tree pits, rain gardens, swales and ponds. This section concentrates on schemes which include ponds. Reviews by DEFRA and CIRIA have shown that when SuDs are considered early in a project, considerable savings can be made in the capital cost of drainage projects, because the use of most expensive underground pipework can be avoided and replaced by soft, surface features.

SuDS Example 1:
The Manor Pond Estate, Sheffield, South Yorkshire
Manor and Castle Development Trust, Bellway Homes, Local Authority

This project includes a series of ponds and basins within a regenerated housing estate comprising 300 houses and service roads. The SuDS scheme is located on adjacent council owned public open space. Water enters the site and is then managed through a series of basins, dropping down through the contours of the site. The opportunity of using the adjacent park, with its watercourse, to store and treat water seemed appropriate and an opportunity to demonstrate better practice. The top basin acts as the main facility for silt collection and pollution interception. Lower down are sand filters installed behind mortar-free stone walling on vertical faces in the lower courses to allow water movement. These filters manage flow at a rate determined by the resistance of the filter and the exit pipe size. This low flow passes down to the next basin below through a shallow low flow channel. If either of the upper two basins is unable to contain and release water through their filters, overflow occurs through a grassed by-pass swale, which leads down to the next basin. The third basin has a volume release control out to an existing dry valley, which leads to the watercourse. If the third basin is unable to handle flow this overflows onto a grass arena as shallow flow and exits through a further control device down to the dry valley. Turf was used to vegetate and stabilise vulnerable areas of the system such as overflow channels and the wet benches of the basins so that the system could be operational at an early date. The permanent ponds are vegetated with reed mace and other marginal aquatic vegetation.

Construction Cost: (Pond elements only) £200/m².

Maintenance Costs: (for whole Manor Pond Estate SuDS system): £10,000 per annum (commuted sum of £250,000 provided for 25 years)

Both capital and revenue costs of the scheme are claimed to be less than a conventional system. As the conventional system which was originally included in the budget was extremely expensive this gave the project team a strong position to argue for a suitable commuted sum for maintenance.

Information from Susdrain case studies Website
SuDS Example 2:
Upton, Northampton
English Partnerships, Pell Frischman Engineers, The Prince’s Foundation, Northampton Borough Council and County Council, Anglian Water, The University of Northampton’s School of Science and Technology

This example demonstrates the use of retention ponds and wetland habitat within a 43ha housing development on green field land. The development – 6000 residential homes, schools, works and retail and community units - was intended to provide an exemplar sustainable community that forms the first part of a major urban extension to Northampton.

The SuDS scheme comprised surface drainage designed to capture roof and road rainwater runoff from the estate (with an additional conventional underground piped system). This runoff travels via permeable paving and open, linked swales (many of which hold water behind stop logs) leading to a series of retention ponds located in a new area of parkland beyond the site into the local green infrastructure; the River Nene Country Park.

The SUDS components were designed to address hydraulic balance, reduce flood risk to Northampton, trap sediment and improve water quality whilst enhancing biodiversity.

Public engagement and monitoring of the SuDS within this housing development site has been carried out since 2003. This project has been used to inform how SuDS can be managed to benefit wildlife, residents and will enable planners and developers to use best practice in providing additional SUDS habitats for local biodiversity and people.
Monitoring by ecologists at the University of Northamptonshire has shown that the ponds attract 14 species of dragonfly as well as other wildlife.

Construction Cost: £150-200/m² (pond elements only varies according to overall size and control structures)

Maintenance: £2/m² per year (estimated)

Information from English Partnerships - now the Homes and Communities Agency (HCA) and https://www.northampton.ac.uk/

Invertebrate ‘Hotel’
Lend Lease HQ Staff Roof Garden
The Green Roof Consultancy

Two large invertebrate hotels were installed as part of the Lend Lease’s HQ staff roof garden. One panel was fixed to a wall and another formed a screen. Each panel was constructed of a number of modules. Each model consisted of untreated reclaimed timber and hardwood logs with a large number of drilled holes. In order to attract a range of species (primarily but not limited to those from the Osmia genus of solitary bees) holes varied in diameter from 2mm to 10mm and were 90mm deep. The panels were oriented to face south to maximise use by a range of invertebrate species, including solitary bees, wasps and spiders. The invertebrates can gain shelter and breed during the year, and the panels are also an overwintering habitat for some species. Such a resource can aid local populations, which in turn conduct essential ecological roles including pollination and pest control and provide a food source for other species such as birds and bats. The panels provide nesting conditions mimicking brood chambers for egg laying and larva development. Suitable locations would include sunny facades sheltered from wind or rain, with
planting of wildlife value located nearby to provide nectar, fruits, seeds and pollen. The panels are fixed to walls or frames but could be is free standing if required. Roof top or ground level installations are possible.

Area: 9m² (one panel)

Supply/Installation Costs: £500/m²

Running Costs: Nil

Lend Lease Roof Garden Invertebrate Hotel (Image: Green Roof Consultancy)
Biodiverse Grassland

Preamble:

The costs of establishing biodiverse or species-rich grassland are similar to the costs of establishing conventional amenity grassland. The cost of maintaining biodiverse grassland is lower, because frequent mowing regimes are usually replaced by one or two annual cuts, however adjusting to new maintenance regimes does require slightly different equipment and techniques.

The establishment of biodiverse grassland and conventional amenity grassland are similar processes, involving seeding or turfing, however with biodiverse swards, low nutrient levels are desirable to ensure that aggressive grasses do not dominate. Therefore the use of nutrient-rich topsoil should be avoided wherever possible when establishing species-rich grasslands. Sub-soil or sandy or stony material is ideal. Direct seeding of existing amenity or improved grassland with wildflowers or a simple relaxation of cutting regime rarely has the desired effect of creating a species-rich sward. Some enhancement may be possible by plug-planting wildflowers, although this is relatively expensive. It is advisable to strip and re-seed or re-turf improved or amenity grassland wherever possible.

Existing or proposed areas of amenity grassland or any plot of unutilised land may be enhanced through re-seeding or planting and amended management practices. Such techniques will increase the plant and insect diversity, which will in turn attract bird and mammal species.

When selecting a wildflower mix it is important to choose species ecologically suited to the site. Cornfield annuals and short-lived biennials establish easily to give immediate effect and act as a nurse crop. This will support long-lived perennial species that are nationally common and typical of the area. Where possible, less common plant material should be sourced locally under licence. Projects should also reflect cultural links and local character and the overall effect should be visually attractive and varied throughout the growing season.

A wide range of commercially available plants/seeds of value to wildlife can be utilised, including wildflower seed mixes, bulbs and plug plants of perennial flowers. A carefully selected locally appropriate palette of native plants used in natural associations can provide ornamental value for the majority of the year as well as providing valuable habitat including seed, pollen, nectar sources for invertebrates and birds from early summer through to winter.

A wildflower seed mix can be sown into a prepared bed or combined with a suitable grass seed mix such. Several seed houses provide mixes for specific soils and situations (e.g. the Emorsgate EL1F wild flowers for lawns). Timing of cutting to allow self-seeding to occur, and the removal of arisings will control nutrient levels whilst enabling flowering plants to persist along with relaxed mowing around trees and margins will provide undisturbed over-wintering habitat for invertebrates and important foraging resources for birds.
Grassland Example 1:  
London House Sparrow Parks Project,  
RSPB, London Parks and SITA

A three year research project in nineteen London parks using 25 trial areas sown with grass and wild flower mixes. The aim of the project was to study the use of the plots for insect and seed based food sources by the House Sparrow with a view to selecting the best mix to support local populations. Parks included Waterlow Park in Camden; Hampstead Heath in City of London; Laycock Green, Paradise Park and Whittington Park in Islington; Leyton Marshes, Tottenham Marshes and Water Works Nature Reserve in Lee Valley Regional Park; The Green park, Hyde park, Kensington Gardens and Primrose Hill in the Royal Parks; Burgess Park and Peckham Rye Park in Southwark; Beddington Park, Cheam Park, Perrets Field, Rose Hill park East and St. Helier Open Space in Sutton: and Tooting Bec Common in Wandsworth.

The plot types were as follows:

- **Long grass** - comprising the existing park grassland, but instead of regular mowing this was left uncut to go to seed, which would then be utilised by seed eating bird species-including house sparrow, and to provide overwintering habitat for invertebrates.
- **A native wildflower meadow mix** - where a mix of native grass and flower species were seeded in order to produce nectar and seeds and sheltering habitat for invertebrates. Maintenance involved annual cut with cuttings removed.
- **‘Wildlife Seed’ plots** - using a bespoke mix of flowers and field margin species that will produce seeds for birds and also be beneficial to invertebrate species. Re-seeding is necessary each year.

Seed mixes were sourced from [Kings Seed](#) and [Emorsgate](#)

All of the trial plots showed biodiversity benefits achieved by improvements to local habitat quality and increased abundance of local invertebrate populations than the traditionally managed amenity grassland. House sparrows need a high protein diet for chicks during weaning in spring and summer and are typically fed insects by their parents; adult birds need more carbohydrate rich foods and so tend to utilise seeds.

Areas: <0.1 ha for wildlife seed plots, average of 0.5ha for the other two treatments.

**Establishment Costs:**

- ‘Long grass’: £680 per hectare (7p/m²)
- Wildflower Meadow: £3,452 per hectare (34p/m²)
- ‘Wildlife Seed’: £12,120 per hectare (£1.21/m²)

**Maintenance Costs:** Typically £1200 per hectare or 12p/m² (for larger wildflower meadows)

Management costs and effort were lowest for the longer grass plot type (although this is the least effective). Costs and management efforts were highest in the first year of wildflower establishment. Costs and management effort for the wildlife seed plots were higher in each year as these plots were established annually and dormant weeds had to be controlled.
Information from John Day, RSPB

**Green Park wildflower meadow**

![Green Park wildflower meadow](image)

**Waterlow Park Wildflower Meadow**

![Waterlow Park Wildflower Meadow](image)
Grassland Example 2:
Popley Fields Residential Development, Basingstoke, North Hampshire
Wildflower Turf Limited, David Wilson Homes, Hickman Bros Landscape Contractors,
Natural England, The Landmark Practice

The site incorporated an area designated for wildlife importance - a Site of Importance for Nature Conservation (SINC) due to the presence of a breeding population of great crested newts. As part of the Protected Species Management Plan high quality habitat was required that connected to the wider site and beyond.

Using products from Wildflower Turf species-rich wildflower meadows were created to provide a dispersal corridor for newts between ponds and meadows. The meadows have been established quickly, are attractive to residents and require little maintenance. Interpretation boards have been situated to help residents learn about the importance of the habitat enhancements.

A variety of products are available from Wildflower Turf including shade tolerant flower mixes for use around mature trees. The turf has a wide selection of native flower and grass species - up to 41 different species, with a minimum of 75% wildflowers. Non-native perennial species can also be used to extend the flowering season. The turf produces nectar, pollen and seeds which support birds, mammals, bees, butterflies and other invertebrate species. The wildflower turf can be used on sites with all soil types; will perform well under shade and in drought conditions, as well as in open meadow conditions.

A species rich lawn turf is available which can be treated as a conventional lawn i.e. regularly mowed short, and used heavily. Unlike standard monoculture amenity lawns the turf will support 26 species of native grasses and wildflowers.

Maintenance such as watering is required for the first two weeks after installation, with occasional soaks required during prolonged dry periods. Cutting regime – one to two cuts per year, once in autumn including clearance of cuttings, leaves and other vegetation under trees in particular, to avoid mulching and the addition of nutrients.

The four years of post-development monitoring indicate that the development has not impacted negatively upon the newt population which in fact appears to be increasing.

Area: 32.2ha estate, 6000m² meadow

Establishment Cost: £60m² to include design and planning (including a species list and management plan), site preparation. For purchase of turf alone the cost is £10m².

Maintenance Cost: Information not supplied, however typical cost of annual cut with arisings removed is 12p/m²

Information provided by [Wildflower Turf](#)
Grassland Example 3:
North-west Target Wellbeing Programme, Knowlsey, Liverpool
Landlife and Groundwork Northwest

This is a programme of over 90 projects run by Landlife (National Wildflower Centre) for the benefit of targeted disadvantaged communities across the Northwest. Locations include Kirkby (Towerhill, Northwood, Central), North Huyton (Woofall Heath, Stockbridge Village – see photo below), Halewood (Torrington, Wood Road, New Hutte), South Huyton, North Liverpool (Everton) Projects have an emphasis on public engagement to provide wildflower improvements to greenspaces in Knowsley. Linked to Natural England's national 'Walking for Health' campaign, this initiative aimed to provide biodiversity gains whilst promoting physical and mental health and wellbeing. Techniques vary depending on the location, but a favoured technique is to strip the existing turf and re-seed with a wildflower seed mix.

One example from this scheme is an area of Public Open Space, in Quarry Green Heights, Northwood, Kirkby. This involved scratch cultivation for cornfield annuals on an area of amenity grassland which had previously been heavily mown. The project was delivered by Landlife and the Community Environmental Task Team in 2004. A variety of successful treatments took place: herbiciding and sowing into short dead turf in autumn, and scratch cultivating and sowing in spring. Additional sowing in subsequent years has helped to build up a substantial seedbank.

After flowering the site was flailed, leaving seed to overwinter providing winter food for birds. Re-cultivating in spring mimics the traditional farming practices that would have sustained cornfield annuals on light soils in the past, Costs: Entire area of all projects of 5.5 ha; since 2008 over 1.5ha of wildflower meadows have been sown into parks and green spaces. Funded by £8.9m from the National Lottery through the Big Lottery Fund (equivalent to £161/m²)

Costs for specific projects are typically lower than this.

Wildflower seed mixes cost around to £90/kg (which provides sufficient seed for 200m² – equivalent to 45p/m²). Preparation and establishment costs vary depending on local conditions however £10/m² is a typical figure for turf stripping and disposal and reseeding.

Information from Landlife and Groundwork

North Huyton. Image: GroundWork

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

a. protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b. minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

171. Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

174. To protect and enhance biodiversity and geodiversity, plans should:

a. Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and

b. promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

175. When determining planning applications, local planning authorities should apply the following principles:

a. if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b. development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c. development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d. development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.
176. The following should be given the same protection as habitats sites:

   a. potential Special Protection Areas and possible Special Areas of Conservation; and
   b. sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

177. The presumption in favour of sustainable development does not apply where development requiring appropriate assessment because of its potential impact on a habitats site is being planned or determined.